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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/766,212

01/29/2004

Masaru Takaishi

AI 325

3347

7590

06/30/2006

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EXAMINER

TOLEDO, FERNANDO L

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 06/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/766,212	Applicant(s) TAKAISHI, MASARU	
	Examiner Fernando L. Toledo	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu et al. (U. S. Patent 6,143,645 A).

3. In re claim 1, Hsu, in the U. S. Patent 6,143,645 A; figures 1 – 3 and related text, discloses forming a silicon-containing thin film 500 in a region having a predetermined area including the inner surface of the contact hole on the surface of the semiconductor substrate; forming an aluminum-containing thin film 520 on the surface of the semiconductor substrate on which the silicon-containing thin film is formed; and heating the semiconductor substrate on which the aluminum-containing thin film is formed to such a temperature as to cause silicon to diffuse with respect to aluminum (Column 4, Lines 15 – 30 and Figure 3) and wherein the semiconductor substrate is provided with several cells each including the contact hole, and the ratio of the amount of silicon contained in the silicon-containing thin film formed in the region having the predetermined area per unit cell to the amount of aluminum supplied to a unit cell in the step of forming the aluminum thin film is not less than 0.1% and not more than 2% by atomic ratio (Figure 3).

4. In re claim 2, Hsu discloses wherein the step of forming an aluminum-containing thin film and the step of heating the semiconductor substrate is carried out simultaneously (Column 4, Lines 15 – 30).

5. In re claim 3, Hsu discloses wherein the step of heating the semiconductor substrate is carried out after completing the step of forming an aluminum-containing thin film (Figure 3).

6. In re claim 4, Hsu discloses wherein the step of forming a silicon-containing thin film in the region having the predetermined area includes the step of: forming a silicon-containing thin film in a region larger than the predetermined area; and removing the silicon-containing thin film so that the area of the silicon-containing thin film can become the abovementioned predetermined area (Column 7, Lines 16 – 19).

7. In re claim 5, Hsu discloses wherein the step of removing the silicon-containing thin film includes a step of removing the silicon-containing thin film using a mask having a predetermined pattern (it is conventional in the art that to form a plug a mask must be used to avoid etching the plug).

8. In re claim 6, Hsu discloses wherein the step of removing the silicon-containing thin film includes a step of removing the silicon-containing thin film by etching (it is well-known in the art and conventional to remove unwanted portions by etching).

9. In re claim 7, Hsu discloses wherein the predetermined area is not more than 99% of the area of the aluminum-containing thin film formed in the step of forming the aluminum thin film (Figure 2).

10. In re claim 9, Hsu discloses wherein the step of heating the semiconductor substrate includes a step of heating the semiconductor substrate to 380°C – 570°C (Column 4, Lines 15 – 30).

Response to Arguments

11. Applicant's arguments filed 14 December 2005 have been fully considered but they are not persuasive for the following reasons.

12. Applicant contests that the substrate is not heated in the reference of Hsu.

Examiner respectfully submits that Hsu discloses heating the substrate when the aluminum alloy is being reflowed in cavity 202. Also Hsu discloses "filling was performed with high pressure extrusion of aluminum alloy at a heater temperature of 450°C (column 4, lines 4 – 6).

13. Applicant contests that Hsu does not teach the claimed ratio.

Examiner respectfully submits that Hsu discloses such limitation in column 2, lines 1 – 20. Applicant argues that Hsu teaches that the aluminum alloy has several problems, however, this is not teaching away and Hsu in fact teaches that it is well-known in the art to make contact plugs of an aluminum alloy having at least 1% of silicon.

14. Applicant also contests that Hsu does not show multiple contact holes.

Examiner respectfully submits that Hsu teaches that CMOS technology has several contact holes in column 1, lines 15 – 20.

15. This supplemental action supersedes the final action mailed on 6 March 2006.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Fri 12pm-7:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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A handwritten signature in black ink, appearing to read 'F. L. Toledo', with a stylized, cursive script.

Fernando L. Toledo
Patent Examiner
Art Unit 2823

flt

27 June 2006